

Course Syllabus



Course Description: An introduction to chemical compounds and their biogeochemical cycles in the oceans and atmosphere, with emphasis on climate issues like ocean acidification, greenhouse gases and the carbon cycle, other biogeochemical cycles, chlorofluorocarbons and the ozone hole, urban pollutants and their photochemistry, and aerosol particles and their effects on clouds.

Prerequisites: CHEM 6C or CHEM 6CH and MATH 20C or MATH 31BH or consent of instructor.

Textbook:

Oceanic topics in this course (Instructor: Aluwihare) will use either Pilson 2013 *An Introduction to the Chemistry of the Sea* (P) or Emerson and Hedges 2008 *Chemical Oceanography and the Carbon Cycle* (EH). Both are available online through the UCSD library but restricted UCSD IP addresses.

Atmospheric topics in this course (Instructor: Russell) use [Jacob 2000 Introduction to Atmospheric Chemistry](#), available as pdf to download for each module.

Office Hours: Mondays on Zoom @3pm (see Zoom Calendar) and after class in NH101; and by appointment (as requested).


Lecture Schedule (this may be updated during the quarter):

Date	Dy	Ins.	Ch	Lectures and Topics
2-Apr	Tu	LA+LR		Course Overview: Why study the Chemistry of the Ocean and Atmosphere together?
4-Apr	Th	LA	EH2	How Does the Sea Become Salty?
9-Apr	Tu	LA	P5	Air-Sea Gas Exchange
11-Apr	Th	LA	EH6	Interactions Between Ocean Biology and Chemistry
16-Apr	Tu	LA	P8	Interactions Between the Particle Cycle and Ocean Mixing
18-Apr	Th	LA	P12	Oxygen Deficient Zones and their Influence on Other Elements.
23-Apr	Tu	LR	10	Stratospheric Ozone Formation
25-Apr	Th	LR	10	The Ozone "Hole"
30-Apr	Tu	LR	11	Tropospheric Oxidation by OH
2-May	Th	LR	11	Tropospheric O ₃ Production
7-May	Tu	LR	12	Ozone Limiting Factors
9-May	Th	LR	12	Ozone and Pollution Control
14-May	Tu	LA	EH4	Ocean Inorganic Carbon System
16-May	Th	LA	P7	Anthropogenic Carbon Dioxide Uptake by the Ocean
21-May	Tu	LA		Ocean Acidification

23-May	Th	LA		Marine Carbon Dioxide Removal (Geoengineering)
28-May	Tu	LR	8	Aerosols and their Lifetimes
30-May	Th	LR	8	Aerosols and Climate Engineering
4-Jun	Tu	LR	7	Greenhouse Gas Effects and their Chemistry
6-Jun	Th	LA+LR		REVIEW
11-Jun	Tu	LA+LR		Take-Home Final Exam due at 11:00am on June 11.

Assignments and Exams: The homework assignments are designed to provide practice for the exams, and as such they are intended to be challenging. We are happy to help if you get stuck, and we are confident that you can complete them successfully. Homework assignments are due on Tuesdays, and the Final Exam is listed in the schedule. Extra credit assignments may be added as appropriate. Check the online syllabus to find new updates.

Scanning App: We require that homework and exams be typed using a text editor, but you are allowed to handwrite equations and figures if you prefer. You can add them into your homework with a scanning app. There are many free scanning apps for cell phones, e.g. GeniusScan

<https://thegrizzlylabs.com/genius-scan>  (<https://thegrizzlylabs.com/genius-scan>). It is easy to use, allows students to make multi-page pdfs, and can automatically apply color and perspective corrections. The scan results can be pasted into your document and then uploaded as a single pdf to Canvas or Gradescope.

Grading. UC San Diego students will be provided a grade between A+ and F as given below. The assignments are weighted as 30% for homework and 20% for the final exam for each of the two parts of the course (Atmosphere and Ocean). The homework will involve problem solving, and you are allowed to ask instructors and other students for advice, as long as you understand the answer you submit. The exam questions will be based on the homework, but you will not be allowed to ask for advice. Graded homework in this course will be posted individually on Canvas and Gradescope. Regrades can be requested on Gradescope and will be reviewed by the grader and instructors.

Letter Grade	Range
A+	100%to97%
A	< 97%to94%
A-	< 94%to90%
B+	< 90%to87%
B	< 87%to84%
B-	< 84%to80%
C+	< 80%to77%
C	< 77%to74%
C-	< 74%to70%

Letter Grade	Range
D	< 70% to 60%
F	< 60% to 0%

Late Work Policy: There are no make-ups for exams. Late homework is accepted with a penalty of 10%/day, with a documented reason, at instructor's discretion. Gradescope will allow late submissions until the answers are presented in class; submit on time so that we can all progress through this learning experience together.

Extra Credit: Additional assignments may be offered with extra credit points assigned for correct completion. These may include online quizzes on the reading, practice exam questions, and course surveys. Canvas will not add these extra credit points to your grade until the end of the course.

Grades of "Incomplete": The current university policy concerning incomplete grades will be followed in this course. Incomplete grades are given only in situations where unexpected emergencies prevent a student from completing the course and the remaining work can be completed the next semester. Your instructor is the final authority on whether you qualify for an incomplete. Incomplete work must be finished by the end of the subsequent quarter or the "I" will automatically be recorded as an "F" on your transcript.

Attendance Policy: All students are responsible for all information and updates provided in all scheduled lectures, which have been scheduled for UCSD podcasting. Our expectations for your attendance of class is that you be prepared, engaged, and "present" for all discussions or activities. Illness and unforeseen circumstances may prevent you from attending one or more classes during the quarter. Automated recordings have been scheduled, but they do not always work perfectly.

Policies and Information

Our Classroom. I hope you will join me in creating a class that upholds these values to further enhance our learning as a community. For more information, please visit: <http://diversity.ucsd.edu> (<http://diversity.ucsd.edu/>). All UC San Diego students are part of the UC San Diego community and are expected to follow university and UC-wide policies, including the [Student Conduct Code](https://studentconduct.ucsd.edu/procedures/index.html) (<https://studentconduct.ucsd.edu/procedures/index.html>). The UC San Diego Student Conduct Code represents the pride and values that define our community, and include the [UC San Diego Principles of Community](https://ucsd.edu/about/principles.html) (<https://ucsd.edu/about/principles.html>), which further illustrate the expectations for all members of our community.

Academic Integrity and Artificial Intelligence. In this course, you are encouraged to ask for help from the instructors and other students for the homework in order to develop your answer, as long as you understand the answer you turn in and you cite any sources you use other than the course material. On the exams, you may not ask help from other students (or Chegg-like services) but you may use publicly-

available artificial intelligence tools, such as Google search and ChatGPT, as an aid to finding answers, if you clearly cite these sources. However, answers are considered correct based on the course material rather than cited sources, so please be sure that you verify information from other sources in the context of the course material. Reports of alleged violations of academic integrity will be handled under the policies and procedures set forth in the [UCSD Policy on Integrity of Scholarship](https://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2) (<https://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2>).

Non-Discrimination and Sexual Harassment. The University of California, in accordance with applicable Federal and State law and University policy, does not allow discrimination or harassment based on race, color, national origin, religion, sex, gender identity, pregnancy, physical or mental disability, medical condition (cancer related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services. If you have questions, contact the [Office for the Prevention of Harassment and Discrimination \(OPHD\)](http://reportbias.ucsd.edu) (<http://reportbias.ucsd.edu>) at (858) 534-8298 or ophd@ucsd.edu.

Land Acknowledgement. UC San Diego was built upon the territory of the Kumeyaay Nation. From time immemorial, the Kumeyaay people have been a part of this land.

Resources. UCSD provides important services to support you in completing this course, including those listed below.

Learning and Academic Support

- [Ask a Librarian: Library Support](https://library.ucsd.edu/ask-us) (<https://library.ucsd.edu/ask-us>) Chat or make an appointment with a librarian to focus on your research needs
- [First Gen Student Success Coaching Program](https://successcoaching.ucsd.edu/) (<https://successcoaching.ucsd.edu/>) Peer mentor program that provides students with information, resources, and support in meeting their goals
- [Office of Academic Support & Instructional Services \(OASIS\)](https://oasis.ucsd.edu/) (<https://oasis.ucsd.edu/>) Intellectual and personal development support
- [Writing Hub Services in the Teaching + Learning Commons](https://commons.ucsd.edu/academic-support/writing/index.html) (<https://commons.ucsd.edu/academic-support/writing/index.html>) One-on-one online writing tutoring and workshops on key writing topics
- [Supplemental Instruction](https://aah.ucsd.edu/supplemental-instruction-study-group/) (<https://aah.ucsd.edu/supplemental-instruction-study-group/>) Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically challenging courses

Support for Well-being and Inclusion:

- [Basic Needs at UCSD](https://basicneeds.ucsd.edu/) (<https://basicneeds.ucsd.edu/>) Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live is encouraged to





contact: foodpantry@ucsd.edu (<mailto:foodpantry@ucsd.edu>) | basicneeds@ucsd.edu (<mailto:basicneeds@ucsd.edu>) | (858) 246-2632












- [Counseling and Psychological Services](https://wellness.ucsd.edu/caps) (<https://wellness.ucsd.edu/caps>) Confidential counseling and consultations for psychiatric service and mental health programming
- [Triton Concern Line](https://blink.ucsd.edu/instructors/advising/concern/) (<https://blink.ucsd.edu/instructors/advising/concern/>) Report students of concern: (858) 246-1111
- [Office for Students with Disabilities \(OSD\)](https://disabilities.ucsd.edu/) (<https://disabilities.ucsd.edu/>) Supports students with disabilities and accessibility across campus











[Community and Resource Centers](https://students.ucsd.edu/student-life/diversity/) (<https://students.ucsd.edu/student-life/diversity/>)










- [Office of Equity, Diversity, and Inclusion](https://diversity.ucsd.edu/) (<https://diversity.ucsd.edu/>) As part of the [Office of Equity, Diversity, and Inclusion](https://diversity.ucsd.edu/) (<https://diversity.ucsd.edu/>), the campus community centers provide programs and resources for students and contribute toward the evolution of a socially just campus (858).822-.3542 | diversity@ucsd.edu (<mailto:diversity@ucsd.edu>)
- [Get Involved](https://getinvolved.ucsd.edu/) (<https://getinvolved.ucsd.edu/>) Student organizations, clubs, service opportunities, and many other ways to connect with others on campus
- [Undocumented Student Services](https://uss.ucsd.edu/) (<https://uss.ucsd.edu/>) Programs and services are designed to help students overcome obstacles that arise from their immigration status and support them through personal and academic excellence










Course Summary:

Date	Details	Due
Mon Apr 1, 2024	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032718&include_contexts=course_56357)	3pm to 4pm
Mon Apr 8, 2024	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032719&include_contexts=course_56357)	3pm to 4pm
Wed Apr 10, 2024	 Homework BONUS (Ocean) (https://canvas.ucsd.edu/courses/56357/assignments/771060)	due by 11:59pm
Mon Apr 15, 2024	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032720&include_contexts=course_56357)	3pm to 4pm

Date	Details	Due
Wed Apr 17, 2024	 Homework 1 (Ocean) https://canvas.ucsd.edu/courses/56357/assignments/771061	due by 11:59pm
Mon Apr 22, 2024	 SIO 174 - Office Hours https://canvas.ucsd.edu/calendar?event_id=1032721&include_contexts=course_56357	3pm to 4pm
Tue Apr 23, 2024	 QuizOnReading- AtmosphereCh10 (0.2% ExtraCredit) https://canvas.ucsd.edu/courses/56357/assignments/771051	due by 9:30am
Wed Apr 24, 2024	 Homework 2 (Ocean) https://canvas.ucsd.edu/courses/56357/assignments/771062	due by 11:59pm
Mon Apr 29, 2024	 SIO 174 - Office Hours https://canvas.ucsd.edu/calendar?event_id=1032722&include_contexts=course_56357	3pm to 4pm
Mon Apr 29, 2024	 Office Hours https://canvas.ucsd.edu/calendar?event_id=1027744&include_contexts=course_56357	3pm to 3:30pm
Tue Apr 30, 2024	 QuizOnReading- AtmosphereCh11 (0.2% ExtraCredit) https://canvas.ucsd.edu/courses/56357/assignments/771053	due by 9:30am
Tue Apr 30, 2024	 Homework 3 (AtmosphereCh10) https://canvas.ucsd.edu/courses/56357/assignments/771066	due by 6pm
Thu May 2, 2024	 SIO174 - In-Person Office Hour @NH343-Russell (also on zoom) https://canvas.ucsd.edu/calendar?event_id=1027738&include_contexts=course_56357	3pm to 4pm
Mon May 6, 2024	 SIO 174 - Office Hours https://canvas.ucsd.edu/calendar?event_id=1032723&include_contexts=course_56357	3pm to 4pm
Mon May 6, 2024	 SIO 174 - Office Hours https://canvas.ucsd.edu/calendar?	3pm to 4pm

Date	Details	Due
	event_id=1027737&include_contexts=course_56357	
	 QuizOnReading- AtmosphereCh12 (0.2% ExtraCredit) (https://canvas.ucsd.edu/courses/56357/assignments/771050)	due by 9:30am
Tue May 7, 2024	 Homework 4 (Atmosphere Ch11) (https://canvas.ucsd.edu/courses/56357/assignments/771067)	due by 6pm
	 SIO 174 - Office Hour (https://canvas.ucsd.edu/calendar?event_id=1027743&include_contexts=course_56357)	6:30pm to 7:30pm
Mon May 13, 2024	 SIO 174 - Chemistry of Atmosph and Ocean - OFFICE HOURS (https://canvas.ucsd.edu/calendar?event_id=1027739&include_contexts=course_56357)	3pm to 4pm
	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032724&include_contexts=course_56357)	3pm to 4pm
Tue May 14, 2024	 Homework 5 (Atmosphere Ch12) (https://canvas.ucsd.edu/courses/56357/assignments/771068)	due by 6pm
Mon May 20, 2024	 SIO 174 - Chemistry of Atmosph and Ocean - OFFICE HOURS (https://canvas.ucsd.edu/calendar?event_id=1027740&include_contexts=course_56357)	3pm to 4pm
	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032725&include_contexts=course_56357)	3pm to 4pm
Wed May 22, 2024	 Homework 6 (Ocean) (https://canvas.ucsd.edu/courses/56357/assignments/771063)	due by 11:59pm
Thu May 23, 2024	 SIO 174 - Chemistry of Atmosph and Ocean - Russell [SP23]	3pm to 4pm

Date	Details	Due
	(https://canvas.ucsd.edu/calendar?event_id=1027747&include_contexts=course_56357)	
Mon May 27, 2024	 SIO 174 - Chemistry of Atmosph and Ocean - OFFICE HOURS (https://canvas.ucsd.edu/calendar?event_id=1027741&include_contexts=course_56357)	3pm to 4pm
	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032726&include_contexts=course_56357)	3pm to 4pm
Tue May 28, 2024	 QuizOnReading- AtmosphereCh8 (0.2% ExtraCredit) (https://canvas.ucsd.edu/courses/56357/assignments/771054)	due by 9:30am
Wed May 29, 2024	 Homework 7 (Ocean) (https://canvas.ucsd.edu/courses/56357/assignments/771069)	due by 11:59pm
Thu May 30, 2024	 SIO 174 - Chemistry of Atmosph and Ocean - Russell [SP23] (https://canvas.ucsd.edu/calendar?event_id=1027735&include_contexts=course_56357)	3pm to 4pm
	 SIO 174 - Chemistry of Atmosph and Ocean - OFFICE HOURS (https://canvas.ucsd.edu/calendar?event_id=1027742&include_contexts=course_56357)	3pm to 4pm
Mon Jun 3, 2024	 SIO 174 - Office Hours (https://canvas.ucsd.edu/calendar?event_id=1032727&include_contexts=course_56357)	3pm to 4pm
	 SIO174 Office Hours (https://canvas.ucsd.edu/calendar?event_id=1027736&include_contexts=course_56357)	3pm to 4pm
Tue Jun 4, 2024	 QuizOnReading- AtmosphereCh7 (0.2% ExtraCredit) (https://canvas.ucsd.edu/courses/56357/assignments/771052)	due by 9:30am

Date	Details	Due
	 Homework 8 (Atmosphere Ch8) https://canvas.ucsd.edu/courses/56357/assignments/771064	due by 6pm
Thu Jun 6, 2024	 SIO 174 - Atmosphere Review Session https://canvas.ucsd.edu/calendar?event_id=1027746&include_contexts=course_56357	3:30pm to 4:30pm
Fri Jun 7, 2024	 Homework BONUS (Atmosphere Ch7) https://canvas.ucsd.edu/courses/56357/assignments/771065	due by 6pm
Sat Jun 8, 2024	 SET Survey Completion (1% Extra Credit) https://canvas.ucsd.edu/courses/56357/assignments/771082	due by 11:59pm
Mon Jun 10, 2024	 SIO174 Office Hour https://canvas.ucsd.edu/calendar?event_id=1027745&include_contexts=course_56357	3pm to 4pm
	 Atmosphere-PracticeExamQuestions https://canvas.ucsd.edu/courses/56357/assignments/771056	due by 11am
Tue Jun 11, 2024	 FinalExam-Atmosphere https://canvas.ucsd.edu/courses/56357/assignments/771059	due by 11am
	 FinalExam-Ocean https://canvas.ucsd.edu/courses/56357/assignments/771058	due by 11am
	 Course Grade https://canvas.ucsd.edu/courses/56357/assignments/771057	